# Before the Federal Communications Commission Washington, DC 20554

In Re	)	
	)	
Petitions Regarding The Use of Signal	)	WT 10-4
Boosters and Offer Signal Amplification	)	
Techniques Used with Wireless Services	)	

# Comments of United States Cellular Corporation

United States Cellular Corporation ("USCC") hereby files its Comments in the above-captioned proceeding. USCC applauds the FCC for commencing this proceeding and urges the Commission to act expeditiously against the proliferation of unlawful wireless "boosters" and "repeaters" (hereinafter collectively referred to as "boosters"), which now threatens the provision of wireless service throughout the United States. Specifically, the FCC must adopt rules which provide that signal boosters may only be deployed with the express written consent of wireless licensees. This action would be in the public interest and the FCC has ample legal authority to take it.

# I. The Public Interest Supports FCC Action Against Unauthorized Signal Boosters.

Wireless carriers are rightly held responsible by the FCC and the public for the quality of service they provide on their networks. They are granted the exclusive right to use certain parts of the radio spectrum and, in return, must provide the best service they can, on reasonable terms and conditions, to their customers. Moreover, as is discussed by CTIA in one of the petitions in this docket, the FCC and other "policy makers" have identified:

"significant public safety-related functions in recognition of the ubiquitous availability of wireless communications and

<sup>&</sup>lt;sup>1</sup> See CTIA Petition For Declaratory Ruling, filed November 2, 2007, pp. 3-6.

the American public's reliance on wireless in their everyday lives."<sup>2</sup>

Among the crucial public interest obligations identified by CTIA in 2007 were "enhanced 911" emergency service, and Priority Access Service. Since 2007, the FCC has added Commercial Mobile Alert Service ("CMAS") to wireless carriers' public safety obligations.<sup>3</sup>

Carriers have, in general, welcomed those new obligations as part of their public interest responsibilities. However, in order for carriers to fulfill these obligations it is essential that the FCC ensure that wireless networks have the opportunity to operate free of harmful interference. In a sense, that is the FCC's obligation, its side of an implicit "bargain" with wireless carriers. It is an obligation that we ask the FCC to carry out in this proceeding.

It is undisputed that wireless boosters have an impact on wireless networks by repeating an amplified signal back to cell sites. This causes the "noise floor" of cell sites to rise, which in turn reduces the cells' capacity, coverage area, and throughput. It is also the case that under certain circumstances wireless boosters may be, on balance, beneficial to wireless network operations. However, in order for that balance to be achieved, booster operation must be closely coordinated with and preferably controlled by the network operator.

To minimize the impact which boosters will have on a wireless network, they must not only be properly designed, but properly installed. The carrier must weigh the benefit to the area where signals are being amplified against the cost of the increased "noise" which will be experienced by the "donor" sector. Neither the booster manufacturer, however reputable, nor the purchaser of the booster, can do this. Proper installation of boosters involves careful coordination with the wireless network, including the use of highly directional antennas pointed

<sup>&</sup>lt;sup>2</sup> Ibid. p. 4.

<sup>&</sup>lt;sup>3</sup> See, e.g. Press Release, "FEMA and The FCC Announce Adoption of Standards For Wireless Carriers To Receive and Deliver Emergency Alerts Via Mobile Devices," released December 7, 2009. USCC has agreed to provide mobile alerts.

back at the "donor" sector. This reduces the size of the area and number of "sectors" the booster will negatively affect. The carrier, with foreknowledge of the booster's location, can mitigate any potential harmful interference from the booster and thus enhance its positive effects.

Carriers can also minimize interference by limiting the number of boosters in the same general area. Again, in geographically specific circumstances, carriers can weigh the benefits of a small number of properly designed and installed boosters against inevitable increases in the noise floor and degradation of cell site performance. An increase in the noise floor also results in mobile devices increasing their own transmitting power to compensate, which can also have negative effects on other mobile units' transmissions. The basic point is that having too many boosters in the same area will inevitably have a negative impact on network performance, including dropped calls. If a carrier has to contend with large numbers of boosters not installed in cooperation with the carrier, operating at unknown locations in a given area, it rapidly becomes extremely difficult for the carrier to provide an acceptable level of service. And this problem is aggravated by the new models of mobile boosters, which are non-directional, and virtually impossible either to install properly or monitor.

Contrary to the representations of Wilson Electronics, FCC "certification" of boosters is not a sufficient safeguard against the interference problems referred to above, though of course boosters should be manufactured in accordance with FCC requirements, as recommended by Wilson Electronics. This is because both proper installation of individual boosters and limiting their number in a given area are critical to minimizing interference, and both of those prerequisites require the involvement of the wireless licensee at the installation stage of the process.

<sup>&</sup>lt;sup>4</sup> See Wilson Electronics, Inc. Petition for Rulemaking, filed November 3, 2009, pp. 10-13.

The need for carrier consent to the deployment of wireless boosters is recognized by three of the five entities whose petitions are the subject of this proceeding. CTIA would require prior carrier consent.<sup>5</sup> The DAS Forum would impose a requirement on the owner/installer of a booster to coordinate with the appropriate local wireless carrier or carriers through a proposed "industry code of conduct." And the Bird Technologies Group, a supplier of RF products, systems, and services for public safety entities, has nonetheless concluded that authority to operate boosters on Part 90 frequencies should be limited to licensees, and that non-licensees should only be able to deploy signal boosters with the express permission of the licensee. <sup>7</sup>

# II. The FCC Has Ample Statutory Authority To Act, and, If Necessary, Should Adopt New Regulations To Ensure Carrier Control Over Booster Deployment.

As is noted by CTIA, the Communications Act and the FCC's Rules require a license prior to the operation of radio frequency equipment on licensed spectrum. Moreover, USCC is persuaded that those sections, as well as other sections, such as Section 333 of the Act, authorize the FCC to move forward now, on a declaratory ruling basis, to require carrier consent to booster operations. If, however, the FCC believes that its own regulations do not confer clear legal authority to take this step, it should adopt the necessary Notice of Proposed Rulemaking and move forward to adopt clear and unambiguous rules to accomplish this. The rules proposed for Part 90 frequencies by Bird Technologies could easily be adopted for Part 22,

<sup>10</sup> CTIA Petition, pp. 10-14,

<sup>&</sup>lt;sup>5</sup> CTIA Petition, pp. 10-14.

<sup>&</sup>lt;sup>6</sup> Petition of DAS Forum, filed October 23, 2009, pp. 6-8.

<sup>&</sup>lt;sup>7</sup> Petition of Bird Technologies Group, filed August 18, 2005, pp. 9-10.

<sup>&</sup>lt;sup>8</sup> CTIA Petition, p. 11; 47 U.S.C. §301 ("no person shall use or operate any apparatus for the transmission of energy or communications of signals by radio ... except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act); see also 47 C.F.R. § 1.903 (requiring a license for Wireless Radio Service Stations); 47 C.F.R. § 22.3 (requiring a valid license to operate stations in the Public Mobile Service).

<sup>9</sup> 47 U.S.C. § 333 ("No person shall willfully or maliciously interfere with or cause interference to any radio communications of any station licensed or authorized by or under this chapter...")

<sup>&</sup>lt;sup>11</sup> See Petition of Wilson Electronics, Inc., filed November 3, 2009, pp. 8-10.

24, and 27 frequencies.<sup>12</sup> Crucial to any rule which is adopted is that the owners/installers of wireless boosters obtain written or electronic consent, in accordance with the provisions of the E-SIGN Act,<sup>13</sup> to their deployment from licensees on whose frequencies they will operate.

#### III. The Need For FCC Action Is Urgent.

Over the years, USCC has often sought FCC assistance in shutting down unlawful booster operations. It has often received such assistance from FCC regional offices familiar with the havoc which unauthorized booster operation can create. But within the Wireless Bureau and in Commissioners' Offices, we have sometimes encountered uncertainty from Commission Staff Members about the full extent of the problem, coupled with a belief that while boosters may be illegal, they are extending wireless service and thus do some good.

Accordingly, USCC considers it appropriate to provide a description of recent instances of interference from unauthorized boosters. We would note that these boosters were manufactured by reputable manufacturers and had received FCC certification. But they were improperly installed or otherwise malfunctioned, causing unacceptable interference to USCC's network. These examples are not intended to be exhaustive, but they are typical, and could be multiplied many fold. As access to unauthorized repeaters by the general public continues to increase, all carriers have to deal with the problem of harmful interference, which is growing in scope every day.

# Redmond, OR [August 2004]

In a B Band market, a high concentration of RV's during an RV rally using boosters caused interference to three surrounding sites. Customers immediately began calling USCC call centers and visiting our retail stores, reporting difficulties making and receiving calls.

<sup>&</sup>lt;sup>12</sup> Bird Technologies Petition, pp. 9-10.

<sup>&</sup>lt;sup>13</sup> The Electronic Signatures In Global and National Commerce Act (E-SIGN Act) defines an "electronic signature" as "an electronic sound, symbol, or process attached to or logically associated with a contract or other record and executed or adopted by a person with the intent to sign the record." 15 U.S.C. § 7006(5). The Act further defines an "electronic record" as "a contract or other record created, generated, sent, communicated, received, or stored by electronic means." 15 U.S.C. § 7006(4).

Working with the local police department and RV rally staff, USCC engineers eliminated the possibility of any authorized boosters in use to be the source of the interference. The interference was shown to be originating from a group of RV's where boosters were actively being used and sold.

Engineers took measurements with a spectrum analyzer and a Yagi antenna from three separate locations pointing it away and towards the locations of the RV's. In each instance the reverse link noise rise in the direction of the RV's was 40 to 50 dB higher than when the Yagi was pointing away from the RVs at the same location.

This RV rally lasted for four days with numerous customer complaints and hundreds of technician hours spent pin pointing and trying to lessen the harm to network caused by the interference. As a result of the customer dissatisfaction caused by the loss of network availability, USCC credited free months of service to numerous customers in the affected area.

# Panora, IA [January 2008]

A local fire department installed a booster. The amplifier malfunctioned and started generating strong interference in the reverse link. It took out service for approximately a 10 mile radius in which calls could not be processed. Signals taken from across the street showed the interfering signal at -36 dBm.

# Milwaukee, WI [December 2006]

A booster with 60 dB gain, installed approximately one mile away from a cell site, caused the noise floor for the affected cell site sector to spike from -108 dBm to over -93 dBm. As a consequence, the drop percent rate for a nearby sector increased from 0.5 % up to over 3.5%.

# West Waukesha, WI [December 2006]

Five boosters were found to be installed at a single location a block away from a cell site. The noise floor experienced by the affected sector increased from -108 dBm up to over -98 dBm. Consequently, the drop call rate increased alarmingly from less than 1% to over 12%.

#### New Berlin, WI [January 2007]

A booster was installed less than a mile away from cell site. The nearby sector's noise floor increased from -109 dBm up to over -85 dBm.

#### Fairfield, IA [November 2009]

A booster was installed at business location, which raised the noise floor of a nearby sector by over 20 dB. The harmful interference lasted for over month before USCC could convince the owner to turn off the booster.

#### Lower Lake, CA [November 2009]

A customer trouble-ticket reported that the ability to roam was hampered within a given coverage area. Several sectors serving the customer's location recorded high BTS antenna receive signal levels. A booster was found eight miles away where it was installed in an individual's home.

# Glendale, OR [September 2009]

USCC received multiple customer complaints in the Glendale area from customers unable to make or receive phone calls. After dispatching a technician to troubleshoot the situation for several hours, the source turned out to be a booster mounted in a vehicle that was emitting a strong spike in the uplink Cellular A band. After powering down the booster, the noise levels returned to normal.

# Lemont, IL [June 2009]

Three cell sites were experiencing unusually high dropped call rates with higher uplink noise levels. The source of interference was found to be a booster installed on a boat which recently docked there. The noise floor and dropped call rates returned to normal when the booster was turned off.

# Chicago, IL [July 2009]

Strong interference was detected, causing a high dropped call rate with USCC having to temporarily decommission service for an entire sector-carrier. The source of interference was found to be an individual apartment. After several days, the occupants admitted to operating a booster and turned it off. Interference and dropped call rate returned to normal.

# Chicago, IL [November 2007]

Customer complaints were received about poor service in the DePaul University campus area. An elevated noise level was apparently occurring for several months, resulting in thousands of additional calls failing. Over the course of <u>four weeks</u>, an engineer spent approximately 60 hours searching for the source of interference, which was occurring intermittently and made troubleshooting challenging. The source was finally found to be a booster operating out of an apartment. When the booster was turned off, customer complaints subsided and noise levels returned to normal.

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# Conclusion

The problem of unlawful boosters threatens the network development of every wireless carrier. It is vital that the FCC act to ban the installation of wireless boosters without carrier consent, either through a declaratory ruling or by means of an expedited rule making.

Respectfully submitted,

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